Sexually Transmitted Diseases: An Update on Treatment Guidelines

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Dr. Karen Kier has no relevant financial relationships to disclose.

Goal. The goal of this lesson is to provide an overview of common sexually transmitted diseases and CDC prevention and treatment guidelines.

Objectives. At the completion of this activity, the participant will be able to:

1. identify the recent trends related to the increasing number of sexually transmitted diseases (STDs);
2. recognize that Chlamydia is one of the most common sexually transmitted diseases and often co-exists with other infections necessitating therapy;
3. list CDC’s recommended drugs of first choice for managing STDs; and
4. state the new CDC recommendations for human papillomavirus vaccines.

Background
In 2014, the Centers for Disease Control and Prevention (CDC) reported an increase in sexually transmitted diseases (STDs) for the first time since 2006. The 2015 CDC fact sheet reported over 20 million new cases of STDs in the United States, with over one-half of these cases occurring in those 15 to 24 years of age. The healthcare cost to manage STDs in the U.S. is estimated to be $16 billion per year.

Chlamydia continues to be one of the most prevalent STDs at over 1.5 million cases reported each year. Another concern is that the current reporting system in the U.S. may miss many cases of STDs.

It is essential that patients and providers adhere to CDC treatment guidelines and that pharmacists are aware of the drug resistance patterns as reported by CDC.

CDC released new data in a YouTube® video from May 30, 2017 outlining some serious concerns about drug-resistant gonorrhea infections. An editorial report from one emergency department evaluating prescribing compliance with CDC guidelines showed that over 40 percent of prescriptions written for STDs did not follow the current drug therapy recommendations, even when CDC guidelines were embedded into the electronic prescribing software.

Pharmacists can play a vital role in the drug therapy management process related to STDs. The effective treatment of STDs can help reduce some of the long-term complications of STDs, which include chronic pain and reproductive health issues such as infertility. This lesson will focus on some emerging issues related to STDs, as well as a review of the CDC recommendations of the more prevalent STDs. The lesson will not focus on hepatitis C or HIV/AIDS as STDs.

Risk factors for developing STDs include age, gender, and the number of sexual partners. Age is the most important demographic factor for new cases of STDs. As CDC reported, the 15- to 24-year age range is at the highest risk of developing STDs. The data suggest that, among sexually active teenagers, the highest rate of STDs is among the youngest in the age group. Historically, men have had a higher rate of STDs than women. This data may be skewed toward men due to a greater ease of detecting STDs in men versus women. In women, STDs can be present without symptoms, making the diseases harder to diagnosis, and women who do not have symptoms are less likely to seek medical care. The greatest risk factor that is not demographic in nature is the number of sexual partners. STD prevalence is disproportionally higher in men who have sex with men (MSM). MSM also have a higher rate of STDs from less common pathogens such as enteric protozoans.

The best way to prevent STDs in those who are sexually active is to use barrier contraceptive devices with latex such as male and female condoms, which have the best evidence for reducing disease transmission. Latex condoms have been found to be superior to natural skin condoms. It is important that patients understand that if they combine a lubricant with a latex condom, the lubricant must be a water-based product. Oil-based products can break down or weaken latex condoms. Pharmacists can help patients select the correct products such as latex con-
<table>
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<th>STD</th>
<th>Drugs of First Choice</th>
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<tr>
<td><strong>Gonorrhea</strong></td>
<td>ceftriaxone 250 mg IM as a single dose with azithromycin 1 gm single oral dose</td>
<td>• Patients who fail ceftriaxone may be given cefixime 400 mg orally with azithromycin 1 gm orally both as a single dose</td>
<td>• Tetracycline antibiotics are no longer recommended due to resistance patterns</td>
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<td></td>
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<td>• Patients who are allergic or cannot tolerate cephalosporins may receive gemifloxacin 320 mg with azithromycin 2 gm as a single dose or gentamicin 240 mg IM with azithromycin 2 gm, both as single doses</td>
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<tr>
<td><strong>Syphilis</strong></td>
<td>For primary, secondary, and early latent infections: benzathine penicillin G 2.4 million units IM injection as a single dose For late latent infections: benzathine penicillin G 2.4 million units IM injection weekly for a total of 3 doses</td>
<td>For primary, secondary, and early latent infections: • Patients who are allergic to penicillin may receive doxycycline 100 mg twice daily for 14 days OR tetracycline 500 mg four times daily for 14 days For late latent infections: • doxycycline or tetracycline for 28 days</td>
<td>• Consult CDC recommendations for neurosyphilis</td>
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<tr>
<td><strong>Chlamydial Infections</strong></td>
<td>azithromycin 1 gm single oral dose OR doxycycline 100 mg twice daily for 7 days</td>
<td>erythromycin base 500 mg four times daily for 7 days OR erythromycin ethylsuccinate 800 mg four times daily for 7 days OR levofloxacin 500 mg daily for 7 days OR ofloxacin 300 mg twice daily for 7 days</td>
<td>• Importance of adhering to the 7 days of therapy • Azithromycin is the preferred agent in pregnancy • Patients should abstain from sexual intercourse for 7 days</td>
</tr>
<tr>
<td><strong>Genital Herpes</strong></td>
<td>For primary infections, use for 7-10 days: acyclovir 400 mg 3 times/day OR acyclovir 200 mg 5 times/day OR valacyclovir 1 gm twice daily OR famciclovir 250 mg 3 times/day For suppressive therapy: acyclovir 400 mg twice daily OR valacyclovir 1 gm daily OR famciclovir 250 mg twice daily OR valacyclovir 500 mg twice daily</td>
<td>• Immunocompromised patients may require different drugs or regimens and should be referred to an infectious disease specialist</td>
<td></td>
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<tr>
<td><strong>Trichomoniasis</strong></td>
<td>metronidazole 2 gm single oral dose OR metronidazole 500 mg twice daily for 7 days OR tinidazole 2 gm single oral dose</td>
<td></td>
<td>• Avoidance of alcohol • Sexual partners treated at the same time • Persistent infections receive a repeat 7-day course</td>
</tr>
<tr>
<td><strong>Human papillomavirus</strong></td>
<td>Pharmacologic methods: podophyllin resin 0.5% solution or gel, applied directly to the wart twice daily for 3 days followed by 4 days of no therapy. This may be repeated for up to 4 cycles OR imiquimod 3.75% or 5% cream, applied at bedtime 3 times per week for up to a maximum of 16 weeks OR sinecatechins 15% ointment, applied to the warts 3 times daily for up to 16 weeks</td>
<td>Provider or in-office treatment</td>
<td>• Proper administration technique • Patients should not be sexually active after medication has been applied • Use of condoms to decrease transmission of HPV</td>
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doms and water-based lubricants. Patients allergic to latex may be counseled to use polyurethane condoms.

Studies show that up to 20 percent of patients do not store condoms appropriately, while up to 40 percent do not use a condom correctly. Pharmacists can provide essential counseling on proper storage and use of condoms.

Untreated STDs can have significant complications. Transfer of STDs during pregnancy and the birthing process is a significant risk factor. The most common STDs that transfer to the neonate after birth include *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, and herpes simplex virus. Syphilis is transmitted across the placenta and can cause an *in utero* infection. Prenatal care and counseling can significantly reduce the risk of neonates being born with STDs, including HIV. Pharmacists can have direct involvement in preconception care as part of the medication therapy management process as described by DiPietro and colleagues (DiPietro NA, Bright DR). Medication therapy management and preconception care: opportunities for pharmacist intervention. *Inov Pharm.* 2014;5(1):article 141).

**Gonorrhea**

Gonorrhea is caused by the gram-negative diplococcus *Neisseria gonorrhoeae*. CDC reported a 13 percent increase in gonorrhea since 2014. The organism attaches to damaged mucosal surfaces and invades the tissue causing a submucosal abscess to form. A purulent discharge can then be secreted. However, not all individuals with gonorrhea exhibit symptoms. Even individuals who have symptoms at the beginning of the infection may become asymptomatic within six months of contracting the disease. Women may experience mucopurulent vaginal discharge and/or vaginal bleeding. Untreated women can go on to develop pelvic inflammatory disease that can result in infertility or ectopic pregnancies. Men will experience a mucopuru-

lent discharge from the penis, as well as painful urination. In fewer than 3 percent of patients, this STD can become a systemic version known as disseminated gonococcal infection. This infection results in necrotic skin lesions, painful joints and tendons, as well as arthritis.

First-line therapy recommended by CDC changed with the 2015 guidelines due to resistance patterns within the U.S. CDC no longer recommends oral cephalosporin treatment, but rather recommends dual therapy. The drugs of first choice are ceftriaxone 250 mg intramuscularly (IM) as a single dose with azithromycin 1 gm orally as a single dose. If this is administered in the emergency department or provider’s office, the pharmacist may not even see the patient. Pharmacists should be informed of the symptoms, as well as the risk for emerging resistance, so they are aware of patients who need to be referred to a provider.

Patients who fail ceftriaxone may be given cefixime 400 mg orally with azithromycin 1 gm orally both as a single dose. Tetracycline antibiotics are no longer recommended due to resistance patterns. Patients who are allergic to or cannot tolerate cephalosporins may receive gemifloxacin 320 mg with azithromycin 2 gm as a single dose, or gentamicin 240 mg IM with azithromycin 2 gm, both as single doses. Refer to the CDC website for additional treatment options for patients with special requirements.

Treatment of gonorrhea is essential in pregnant women to prevent ophthalmia neonatorum in newborn infants. This is a condition that can cause corneal ulceration and blindness. Most states require prophylaxis in newborns with topical ophthalmic antibiotics at birth to prevent blindness. Erythromycin ophthalmic ointment is recommended by CDC as the drug of first choice.

**Syphilis**

Syphilis was nearly eradicated in 2000, but has reemerged. In 2015, the number of cases of syphilis increased by 19 percent to a total of 23,872 reported cases in the U.S. The majority of these cases have been reported in men and predominately in MSM. The causative organism for syphilis is *Treponema pallidum*. The organism is a gram-negative spirochete that penetrates the intact mucous membrane and invades the blood. *Primary syphilis* is known for the hallmark sign of chancres that appear in the first eight weeks and then spontaneously heal. The chancre is a painless ulceration that occurs on the penis. When primary syphilis is not treated, it can cause secondary syphilis. *Secondary syphilis* can be spread through the blood and the lymphatic system. Patients can often have nonspecific symptoms such as fever, lymph swelling, headache, loss of appetite and joint pain. If left untreated, syphilis can result in neurosyphilis, also referred to as tertiary syphilis. Neurosyphilis can result in irreversible dementia in patients. CDC recommends that all patients with a diagnosis of syphilis be tested for co-infection with HIV. *Latent syphilis* refers to patients with a positive test for syphilis but no evidence of the disease. Some of these patients may progress to tertiary syphilis, but with no other clinical manifestations.

The traditional benzathine penicillin G is still the CDC-recommended therapy as a drug of first choice. Benzathine penicillin G should be given as a 2.4 million units IM injection as a single dose for primary, secondary, and early latent infections. Late latent infections should be treated with 2.4 million units of benzathine penicillin G weekly, for a total of three doses. If a patient is allergic to penicillin, then options need to be guided by culture and sensitivity. Those options could include doxycycline 100 mg twice daily for 14 days, or tetracycline 500 mg four times daily for 14 days. It is important that the IM injections be pure benzathine penicillin G, and are not combined with procaine.
penicillin. The use of probenecid to augment blood levels is no longer recommended by CDC, although there are some countries in the world that still use probenecid with penicillin derivatives.

Congenital syphilis can be prevented with appropriate treatment of pregnant patients with syphilis. Prenatal care is an essential component of managing these patients.

Chlamydial Infections
One of the most common STDs is Chlamydia, with over 1.5 million cases in the U.S., as reported by CDC. The difficulty with Chlamydia is lack of symptoms, so it tends to be a very “silent” disease. Therefore, it is recommended to treat for Chlamydia when treating for all other STDs in a patient. Chlamydia is often found as a co-infection in patients diagnosed with gonorrhea; and they should be managed together. Co-infection with Chlamydia is also common in HIV-infected patients as well. Infants can acquire the infection during delivery through the birth canal. The infections can occur in the neonate's eyes, oropharynx, lungs, urogenital tract, or rectum. Chlamydial infections in adults can develop rectally, as well as in the oropharynx. Due to the silent nature, CDC estimates that the actual number of cases of the disease may be double that reported.

Chlamydia is caused by Chlamydia trachomatis, which is an obligate intracellular parasite. Chlamydia can replicate within host cells just like a virus. CDC-recommended guidelines for managing chlamydial infections include azithromycin 1 gm orally as single dose, or doxycycline 100 mg twice daily for seven days. For neonates, the recommended treatment is oral weight-based doses of erythromycin.

Genital Herpes
About 50 million Americans are infected with genital herpes and the number of new cases each year is approximately 500,000. The United States Preventive Services Task Force provided a systematic review of the evidence for the accuracy of screening tests for sexually transmitted genital herpes simplex virus (HSV). The review evaluated 17 studies involving over 9,000 patients. The task force recommendations are that serologic screening for genital herpes should not be routinely recommended due to the high false-positive rate and the potential for psychosocial harm of a false-positive test. In addition, the report indicated that the randomized, controlled trials did not establish a benefit of preventive antiviral medication for asymptomatic HSV-2.

HSV has five stages in the infection cycle. These stages include the (1) primary mucocutaneous infection, (2) infection of the ganglia, (3) latency, (4) reactivation, and (5) recurrent infections. When the virus spreads to contiguous cells and peripheral nerves, it is referred to as replication. The latency stage occurs when the virus establishes itself in a sensory or autonomic nerve root ganglia. The chronic nature of HSV infection is due to lifelong latency of HSV in the ganglia.

When reactivation occurs, the virus becomes symptomatic. Various conditions can cause reactivation such as emotional or physical stress, or changes in immune system function. There is no predictable nature as to how often a patient will have a reactivation of the disease. One of the important counseling points for patients is that the virus can still be actively shed, even in the absence of lesions or symptoms. Educating patients on the means of transmission is important in helping to decrease the spread of the disease. Teaching the patient about the disease and how to properly take the medication, as well as ways to reduce transmission, are all essential when counseling on antiviral therapy. The incubation of the virus can be between two to 14 days with an average of four days. Primary infection can be asymptomatic or mildly symptomatic. Pustular or ulcerative lesions will occur on the external genitalia over a period of seven to 10 days, and will usually resolve in two to four weeks. The patient may experience flu-like symptoms during the first few days of lesions appearing. The shedding of the virus usually lasts for one to two weeks after onset of the infection. This is a good counseling point for patients.

Neonates can be exposed to genital herpes during pregnancy. Neonatal herpes can have a fairly high morbidity and mortality rate. The usual route of exposure is through the birth canal, but it can also be transmitted through the placenta. Pregnant women with HSV-2 should be referred to a specialist prior to delivery.

The most important aspects of treating patients with HSV are to relieve symptoms and to shorten the clinical course of the disease. In addition, efforts should be made to reduce the recurrence rate with suppressive antiviral therapy if warranted. CDC recommendations
for active treatment are different than the therapy options for suppressive therapies. Studies have shown a similar efficacy and safety with all three antivirals recommended. The difference with the therapies is how many doses a patient needs to take during the day, which can affect patient adherence. Antivirals are given for seven to 10 days, but can be extended if necessary. Recommended antivirals include acyclovir 400 mg three times per day, acyclovir 200 mg five times per day, valacyclovir 1 gm twice daily, or famciclovir 250 mg three times daily. When evaluating suppressive therapy, dosing changes to a daily continuous regimen. These therapies include acyclovir 400 mg twice daily, valacyclovir 1 gm daily, or famciclovir 250 mg twice daily. Data suggests that valacyclovir 1 gm daily has improved outcomes over valacyclovir 500 mg twice daily. CDC lists the 500 mg twice daily dose as an acceptable option. Patients who are immunocompromised may require different drugs or regimens, and should be referred to an infectious disease specialist. Patients who are immunocompromised by HIV/AIDS may require different drug therapy as well. They are also more prone to HSV infections of the eye that require other FDA-approved drugs such as intravenous cidofovir.

Trichomoni asis

Trichomoni asis is caused by a flagellated protozoan. This is a disease that has been reported to spread via nonsexual contact including communal bathing or contact with an infected bathroom or toilet articles. The *Trichomonas vaginalis* organism can survive up to 45 minutes in a moist environment. Neonatal infections can also occur from nonvenereal processes. Trichomoni asis is more commonly reported in women than in men.

Treatment includes one of two FDA-approved therapies. Metronidazole 2 gm as a single oral dose or metronidazole 500 mg twice daily for seven days have both shown a cure rate of 95 percent when both sexual partners are treated at the same time. Patient preference, adherence and tolerability may all be issues with the choice of therapies. As with any metronidazole therapy, patients need to be counseled on the avoidance of alcohol and products containing alcohol, such as mouthwash and vanilla extract. The other recommended therapy is tinidazole 2 gm orally in a single dose. Patients with persistent infections should receive a repeat course of either drug for a seven-day course rather than a single dose.

**Human Papillomavirus**

Globally, human papillomavirus (HPV) is considered to be the most common STD. In the U.S., HPV is considered the most common virally transmitted STD. CDC estimates that 80 million people are infected with HPV, and that translates to one out of every four persons in the population. The virus is a small, double-stranded DNA virus with over one hundred HPV types, with 40 genotypes identified that can infect the female genital tract. Most patients can have subclinical forms of HPV with no real symptoms of disease, while approximately 1 percent will develop genital warts. These warts can be large in size and multifocal, which results in discomfort for patients. HPV warts can spontaneously regress within one to two years from initial clinical appearance for some patients.

However, it is possible for patients to become reinfected with HPV. HPV types 6 and 11 are the two genotypes that are most commonly associated with genital warts. HPV has been linked to cervical, penile, vulvar, vaginal, and anal carcinoma. Over one-half million cases of cervical cancer worldwide have been attributed to HPV. Over 50 percent of penile cancers and 90 percent of anal cancers have been associated with HPV. Globally, 5 percent of human cancers are linked to HPV type 16. In addition, infection with HPV type 18 has been associated with cervical cancer. Cervical cancer is the second leading cause of cancer in women worldwide. The development of cervical cancer from HPV alone is a small percentage. Other factors play a role in neoplasia, including host immune system and more aggressive HPV variants. For women, Pap smears are the most cost-effective method of detecting both clinical and subclinical forms of HPV. Better tests are available that involve HPV DNA and RNA that can be used to diagnose HPV without a Pap smear. Routine screening with these tests is not currently recommended over Pap smears, but guidelines may change in the future to include these tests as a part of the screening process. Three percent of vaginal cancers worldwide are attributed to the HPV virus. As seen with cervical cancer, additional risk factors can modify a

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<th>New CDC Human Papillomavirus Vaccination Recommendations</th>
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<td><strong>Vaccination Group</strong></td>
<td><strong>CDC Recommended Doses</strong></td>
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<tr>
<td>Ages 9-14 with ACIP recommendation preferred at age 11 or 12 years (not immunocompromised patients)</td>
<td>2 doses</td>
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<tr>
<td>Ages 15 to 26 years and any immunocompromised patients between 9 and 26 years</td>
<td>3 doses</td>
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person’s risk for developing vaginal cancer. Risk factors combined with HPV infection include smoking, genital warts, immunosuppression, in utero exposure to diethylstilbestrol, and multiple sexual partners. HPV types 16 and 18 have a higher carcinogenic risk, while HPV types 6 and 11 have a lower carcinogenic risk. CDC recommends treatment for macroscopic genital warts and precancerous lesions confirmed by pathology report.

Both surgical and drug therapy can be used to remove external genital warts. Surgical removal, photodynamic therapy, or cryotherapy can be used by providers. Pharmacologic methods can include podophyllin resin 0.5 percent, imiquimod 3.75 percent or 5 percent cream, and sinecatechins 15 percent ointment. Podophyllin resin 0.5 percent can be applied by patients as an at-home therapy, while higher concentrations between 10 to 25 percent are applied by healthcare providers within an office setting. Podophyllin resin 0.5 percent comes as a solution and a gel, and is applied directly to the wart twice daily for three days followed by four days of no therapy. This may be repeated for up to four cycles. Imiquimod cream is applied at bedtime, three times per week for up to a maximum of 16 weeks. Sinecatechins 15 percent ointment is applied to the warts three times daily for up to 16 weeks.

Pharmacists can play a significant role in counseling patients on the proper administration technique for these agents, as well as the potential for side effects. Counseling should include a warning that patients should not be sexually active after medication has been applied. Condom use can decrease the transmission of HPV and is one form of prevention, but condoms may not fully protect. CDC recommends prevention by vaccinating both males and females at the appropriate and FDA-approved ages. The CDC Advisory Committee on Immunization Practices (ACIP), as of October 19, 2016, recommends only two doses of HPV vaccine for both males and females age 11 to 12 years. The second dose should be given at least six months from the first vaccination. ACIP reviewed study data that showed 9- to 14-year-olds given two doses had the same immunogenicity response as the 16- to 26-year-old patients who received three doses. Fifteen to 26-year-old patients should continue to get the CDC-recommended three doses of the vaccine. The studies demonstrated that a two-dose regimen in girls conferred immunogenicity for the bivalent vaccine (Cervarix®), the quadrivalent vaccine (Gardasil®), and the nonavalent vaccine (Gardasil 9®). However, the studies seem to indicate that the two-dose nonavalent vaccine may have some advantages. It is critically important that the second dose be given between six and 12 months in patients for this therapy to be successful. A two-dose series given at zero and two months did not provide the necessary immunogenicity. In an extension study of the two-dose vaccine regimen in girls, the immunogenicity 36 months later showed that 99 percent of girls still had antibodies to HPV type 18, and 100 percent had antibodies to HPV types 6, 11, and 16. Despite this antibody response, the study gave a booster dose of quadrivalent HPV vaccine. The booster dose increased the antibody titters by four-fold in the study and the safety analysis was considered acceptable by the researchers. The nonavalent vaccine (Gardasil 9®) provides protection against HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58. The previous quadrivalent vaccine only provided protection against HPV types 6, 11, 16, and 18. The nonavalent vaccine provides prevention for the highly carcinogenic HPV types 16, 18, 31, 33, 45, 52, and 58. The bivalent vaccine provides protection against HPV types 16 and 18. However, Cervarix® and Gardasil® are no longer available in the U.S.; at the time of publication, only 9-valent HPV vaccine is sold in the U.S. The HPV vaccine is given as a 0.5 mL IM injection. The three-dose regi-
The Zika virus RNA has been found to exist in saliva and urine up to 91 days after symptoms of the virus appear. CDC has reported Zika virus transmission with sexual contact. To understand the risk, a case report from Italy has reported that Zika RNA was detectable in semen 188 days after symptom onset. CDC recommends that both men and women use condoms to prevent the sexual transmission of the Zika virus, even if they do not have symptoms but are traveling or living in an area that has Zika virus present.

Conclusion
The WHO estimates that 357 million new cases of curable STDs occurred globally in 2012. The WHO has documented the global change in emerging resistance to antibiotics especially gonorrhea. Based on this date in 2014, the WHO, the CDC, the National Institutes of Health (NIH), and biotechnology partners published a global roadmap for advancing the development of vaccines for the prevention of STDs. The effort is to advance science to develop vaccines that would reduce the global burden of STDs. The efforts are targeted at herpes simplex, *Chlamydia*, gonorrhea, syphilis, and trichomoniasis.

The pharmacist can play a key role in providing patient education for STDs including counseling on emerging issues. Pharmacists should be aware of resistance patterns to antibiotic therapy and provide recommendations to providers on how to improve antibiotic selections for at-risk patients. Pharmacists can work with local health departments and health systems to get the most recent data on resistance in their communities. In addition, pharmacists are ideally positioned to provide educational programs in their communities, especially targeting the age group of 15 to 24 years. CDC provides excellent resources including fact sheets and pamphlets that pharmacists can obtain to facilitate educational programming. The CDC website is a valuable resource for pharmacists regarding STDs.

The author, the Ohio Pharmacists Foundation and the Ohio Pharmacists Association disclaim any liability to you or your patients resulting from reliance solely upon the information contained herein. Bibliography for additional reading and inquiry is available upon request.

This lesson is a knowledge-based CPE activity and is targeted to pharmacists in all practice settings. Disclosure: The OPF trustees and other individuals responsible for planning OPF continuing pharmacy education activities have no relevant financial relationships to disclose.

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continuing education quiz

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1. Over one-half of new cases of STDs, as reported by CDC, occur in those:
   a. 7-15 years of age.
   b. 15-24 years of age.
   c. 25-40 years of age.
   d. 41-70 years of age.

2. The single greatest risk factor for STDs that is not demographic in nature is:
   a. age.
   b. gender.
   c. past medical history.
   d. number of sexual partners.

3. The drugs of choice recommended by CDC for treatment of gonorrhea are:
   a. metronidazole and azithromycin.
   b. cephalexin and doxycycline.
   c. ceftriaxone and azithromycin.
   d. erythromycin and doxycycline.

4. The drug of choice for prophylaxis of ophthalmia neonatorum is:
   a. silver nitrate drops.
   b. erythromycin ophthalmic ointment.
   c. levofloxacin ophthalmic drops.
   d. cefaclor oral suspension.

5. The hallmark sign of primary syphilis is a:
   a. chancre.
   b. pustule.
   c. boil.
   d. demyelinated ulceration.

6. Which STD can cause irreversible dementia if left untreated?
   a. Syphilis
   b. Gonorrhea
   c. Chlamydia
   d. Trichomoniasis

7. The drug of choice recommended by CDC for treatment of Chlamydia is:
   a. azithromycin.
   b. benzathine penicillin G.
   c. tetracycline.
   d. acyclovir.

8. Which STD requires counseling to avoid sexual contact for seven days while receiving therapy?
   a. Syphilis
   b. Gonorrhea
   c. Chlamydia
   d. Trichomoniasis

9. Current recommendation by the United States Preventive Services Task Force to screen for genital herpes is:
   a. routine annual screening for women.
   b. routine screening for men every five years.
   c. no routine screening for men or women.
   d. routine screening for high risk patients.

10. An important counseling point is that the genital herpes virus can be actively shed, even in the absence of lesions or symptoms.
    a. True
    b. False

11. The drug of choice recommended by CDC for acute treatment of herpes simplex-2 infection is:
    a. cidofovir.
    b. valacyclovir.
    c. azithromycin.
    d. nystatin.

12. Which of the following STDs can be spread by nonsexual contact in adults?
    a. Syphilis
    b. Gonorrhea
    c. Chlamydia
    d. Trichomoniasis

13. Which of the following drugs requires patient counseling on the avoidance of alcohol and alcohol-containing products?
    a. Azithromycin
    b. Penicillin G
    c. Ceftriaxone
    d. Metronidazole

14. How many doses of HPV vaccine does CDC currently recommend for males and females aged 11 and 12 years?
    a. One
    b. Two
    c. Three
    d. Four

15. What type of protection does CDC recommend for males and females to prevent transmission of Zika virus?
    a. Spermicides
    b. Condoms
    c. Abstinence

To receive CPE credit, your quiz must be received no later than October 15, 2020. A passing grade of 80% must be attained. CPE credit for successfully completed quizzes will be uploaded to the CPE Monitor. CPE statements of credit can be printed from the CPE Monitor website. Send inquiries to opa@ohiopharmacists.org.